

## **The Incidence of Nosocomial Infections and Their Role in the Course of Chronic Diseases**

**Mo‘minova Madinakhon Abdulkhaq qizi, Shamuratov Abror Shonazarovich,  
Dzhuraeva Zulfiya Baratovna**

Department of Microbiology, Virology and Immunology of Tashkent Medical Academy

**Abstract:** Nosocomial infection is the most common undesirable phenomenon in healthcare that affects patient safety. They contribute to significant morbidity, mortality and financial burden for patients, families and health systems. The burden of hospital-acquired infection worldwide is unknown due to the lack of surveillance systems for hospital-acquired infection. Nevertheless, infection prevention and control programs have made great efforts to develop surveillance systems and infection control methods. Known pathogens include methicillin-resistant staphylococcus aureus, vancomycin-intermediate staphylococcus aureus and vancomycin-resistant Staphylococcus aureus, Enterobacteriaceae with resistance to extended-spectrum cephalosporins compatible with extended-spectrum beta-lactamases, production of vancomycin-resistant Enterococcus, carbapenem-resistant Enterobacteriaceae and Acinetobacter species, as well as drug-resistant Pseudomonas aeruginosa. Immunocompromised patients and people with permanent devices such as central catheters or urinary catheters are usually associated with opportunistic infections with fungal pathogens. Nosocomial infections are caused by Candida fungi, including species such as C. albicans, C. parapsilosis and C. glabrata. As an emerging organism worldwide, Candida auris is a serious problem. This is due to multidrug resistance and high morbidity and mortality due to difficulties with diagnosis and a high rate of unsuccessful treatment. The unsafe practice of using needles may involve hepatitis B and C acquired in medical institutions and the human deficiency virus (HIV). Nosocomial infections have a wide range of complications, which depend on the type of infection, the severity of the disease and the suspected pathogen. The complications caused by each type of hospital-acquired infection can be very different, but some of the most common are listed below. Thus, it is expected that the introduction of published and evidence-based infection control protocols will significantly reduce the likelihood of pathogen transmission and the overall incidence of nosocomial infections.

**Keywords:** Infectious disease, etiology of nosocomial infections, virus, fungal pathogens.

**The main purpose** of this presented analytical manuscript is to provide a brief review of the literature on the incidence of nosocomial infections and their consequences in chronic diseases.

**Epidemiology of nosocomial infections.** Hospital-acquired infections affect a large number of patients worldwide, leading to increased mortality and economic consequences for health systems. Although the true global burden of health-related infections remains unknown due to the lack of reliable data and surveillance systems, epidemiological studies in Europe and the United States have shown relatively stable results in surveillance programs. Therefore, most epidemiological studies are conducted in the USA and Europe. In European hospitals, the prevalence of at least one nosocomial infection varies depending on the place of practice from up to 5% in primary hospitals; in tertiary hospitals, this figure is more than 7%. More than 19% are in intensive care and up to 4% are in long-term care facilities. It is estimated that about 9 million nosocomial infections occur in emergency and long-term care facilities in the European Union each year. A European study of the prevalence of infections in intensive care units conducted 30 years ago showed that the prevalence of infections in intensive care units was more than 20% [4-11].

**The causative agents of nosocomial infections** are bacteria, viruses and fungi. Some microorganisms have unique properties that contribute to the development of certain types of infections in susceptible hosts. The prevalence of infectious diseases caused by specific microorganisms varies depending on the location of health facilities, medical institutions and the patient population. In general, bacteria are the most common pathogens, followed by fungi and viruses. The most common types of infections include central catheter-associated bloodstream infections, catheter-associated urinary tract infections, surgical site infections, and ventilator-associated pneumonia [9-12]. Bacteria can appear in the natural flora from exogenous or endogenous sources. Damage to the host's immune system causes opportunistic bacterial infections. *Coagulase-negative staphylococci*, *Staphylococcus aureus*, *Streptococcus* groups and *Enterococcus* groups are common gram-positive organisms. The *Enterobacteriaceae* family includes common gram-negative organisms such as *Klebsiella pneumoniae* and *Klebsiella oxytoca*, *Escherichia coli*, *Proteus mirabilis* and various types of *Enterobacter*; *Pseudomonas aeruginosa*, *Acinetobacter baumannii* and *Burkholderia cepacia*. Due to its multidrug-resistant properties, *Acinetobacter baumannii* is associated with high mortality in intensive care settings [10, 11, 12, 13, 14].

**Types of healthcare-related infections.** The responsible pathogens represent different types of nosocomial infections and can originate from various sources. Types of nosocomial infections are classified according to the following criteria in the Centers for Disease Control and Prevention: bloodstream infections associated with the central line, Catheter-associated urinary tract infections, Surgical area infections, Ventilator-associated pneumonia

Nosocomial infections can also be classified by affected systems, such as ear infections; nosocomial pneumonia not associated with artificial ventilation (NV-HAP); gastrointestinal infections (including *Clostridioides difficile*); other primary bloodstream infections not associated with the use of a central catheter; and other urinary tract infections not associated with using a catheter [12-15]. .

**Transmission paths.** Infections related to the health sector can spread in different ways. Microorganisms are transmitted through direct or indirect contact. This is the most common method of transmission. Multidrug-resistant bacteria (e.g. MRSA, gram-negative microorganisms producing ESBL and VRE), *C. difficile* and rotavirus are common microorganisms that can be transmitted by contact. Microorganisms can be transmitted by droplets from the respiratory tract less than three feet away or by large droplets larger than five microns. This is called drip transfer. Influenza, Bordetella pertussis and Neisseria meningitidis are some of the infectious pathogens transmitted by airborne droplets. Airborne transmission is when microorganisms are transported over long distances in small droplets less than 5 microns from the respiratory tract. Chickenpox, tuberculosis, measles viruses and the recently identified SARS-COV-2 virus can spread in the air [11-15].

**Standard precautions should be applied** to protect health workers. The use of personal protective equipment such as gloves, bathrobes, masks and eye protection to protect against blood and other biological fluids is part of this. Precautions should be taken to prevent airborne and contact transmission of infections. The patient should be placed in a separate room with negative pressure and put on a tested N95 respirator to prevent the spread of the virus by airborne droplets. Surgical masks and physical distancing are used to prevent airborne transmission. The patient is placed in one room, and the doctor puts on a bathrobe and gloves to prevent contact transmission of MD RO and *C. difficile*. Invasive and surgical interventions should be performed using aseptic methods. Informing patients. Patients should be informed about the risk of developing NI during treatment. Healthcare professionals should assess the risk factors that may lead to the development of a particular infection in a patient, as well as consider methods by which modifiable risk factors can be limited. Patients with modifiable risk factors should receive training to reduce their risk of developing NI. For example, cleaning, not shaving, and smoking before surgery can reduce NI. Service providers should be careful and cautious

when using devices and invasive interventions. Patients should be trained in the proper use of antibiotics as well as indications to prevent possible misuse [13-17].

**Discussion.** Nosocomial infections are infections that appear 48 hours after admission to the hospital and remain a serious problem for patients hospitalized around the world. In any health department, patients are prone to developing various infections when they receive medical care for another disease. The prevalence of infections continues to rise despite continued progress in hospital treatment. Nosocomial infections can spread in various medical institutions, such as wards, surgical rooms, nursing homes and others. Infections can appear in medical institutions for a variety of reasons. In addition to contaminated tools and equipment, bedding, or aerosols, medical staff can also spread the infection. Unsurprisingly, there is a difference between the values mentioned above; numerous factors such as patient demographics, the situation in the intensive care unit, diagnoses at admission, type of surgery and length of stay must be taken into account. The use of invasive medical instruments is considered a potential source of infection, especially in patients in critical situations. An increased risk of infections associated with the use of devices is associated with the destruction of protective epithelial and mucous barriers and the development and colonization of microorganisms in various forms of foreign bodies injected into the patient. Despite current infection control measures, the prevalence of nosocomial infections continues to increase, leading to an increase in mortality among critically ill patients. This study can help raise awareness of new methods of epidemic surveillance and prevention of nosocomial infections in hospitals and medical centers in more countries. Thus, it is expected that the implementation of infection control protocols, which have been published and are based on evidence, will significantly reduce the likelihood of pathogen transmission and the overall incidence of nosocomial infections [10-20].

**Conclusion.** It has become difficult for health administrations and the infection control committee to achieve the goal of eliminating intervals due to the increased burden of nosocomial infections and antimicrobial resistance. However, infection control committees have developed reasonable and healthy medical care practices that control the spread of these infections and use appropriate antimicrobial use methods to easily reduce the resistance of new pathogens to antimicrobial drugs. WHO has developed an effective surveillance method that can help health institutions develop infection control programs. Hospital-acquired infections can be reduced through proper training of hospital staff on biosafety, proper waste management and health care reforms, as well as the general public about these common infections.

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